

Claims

- [c1] An electronic packaging structure comprising:
a chip carrier;
at least two semiconductor devices attached to said chip carrier, where at least one of said at least two semiconductor devices has a different thickness;
a heat spreader having a substantially planar surface in thermal contact with said at least two semiconductor devices; and
a thermal adhesive layer in contact with said heat spreader and with said at least two semiconductor devices whereby a semiconductor device requiring a lower thermal resistance has a thinner thermal adhesive layer than a semiconductor device which can tolerate a higher thermal resistance.
- [c2] The packaging structure of claim 1 wherein said chip carrier is a ceramic chip carrier.
- [c3] The packaging structure of claim 1 wherein said chip carrier is an organic chip carrier.
- [c4] The packaging structure of claim 1 wherein said semiconductor devices are selected from the group consist-

ing of integrated circuit chips, capacitors, resistors and thermistors.

- [c5] The packaging structure of claim 1 wherein said heat spreader is comprised of material selected from the group consisting of diamond, Si, SiC, Mo, ceramic and composites containing these materials.
- [c6] The packaging structure of claim 1 wherein said thermal adhesive layer is comprised of a material selected from the group consisting of Ag filled epoxy, filled thermoplastic, filled polymer, filled polymer adhesive, metal and solder.
- [c7] The packaging structure of claim 1 wherein a different thermal adhesive layer is used for a semiconductor device which has a different thickness.
- [c8] The packaging structure of claim 1 wherein said at least two semiconductor devices comprise at least one high power density semiconductor device and at least one low power density device and a compliant thermal adhesive layer material is used on said lower power density semiconductor device and a rigid thermal adhesive layer material is used on said high power density device.
- [c9] The packaging structure of claim 1 wherein said heat spreader is the package lid.

- [c10] The packaging structure of claim 1 further comprising a heat sink in thermal contact with said heat spreader.
- [c11] A method for cooling multiple semiconductor devices with different cooling requirements on a common chip carrier with a common lid or heat spreader comprising the steps of:
providing a chip carrier;
attaching at least two semiconductor devices to said chip carrier, where at least one of said at least two semiconductor devices has a different thickness;
placing a heat spreader having a substantially planar surface in thermal contact with said at least two semiconductor devices; and
placing a thermal adhesive layer in contact with said heat spreader and with said at least two semiconductor devices whereby a semiconductor device requiring a lower thermal resistance has a thinner thermal adhesive layer than a semiconductor device which can tolerate a higher thermal resistance.
- [c12] The method of claim 1 wherein said chip carrier is a ceramic chip carrier.
- [c13] The method of claim 1 wherein said chip carrier is an organic chip carrier.

- [c14] The method of claim 1 wherein said semiconductor devices are selected from the group consisting of integrated circuit chips, capacitors, resistors and thermistors.
- [c15] The method of claim 1 wherein said heat spreader is comprised of material selected from the group consisting of diamond, Si, SiC, Mo, ceramic, and composites containing these materials.
- [c16] The method of claim 1 wherein said thermal adhesive layer is comprised of a material selected from the group consisting of Ag filled epoxy, filled thermoplastic, filled polymer, filled polymer adhesive, metal and solder.
- [c17] The method of claim 1 wherein a different thermal adhesive layer is used for a different semiconductor device thickness.
- [c18] The method of claim 1 wherein said at least two semiconductor devices comprise at least one high power density semiconductor device and at least one low power density device and a compliant thermal adhesive layer material is used on said lower power density semiconductor device and a rigid thermal adhesive layer material is used on said high power density device.

[c19] The method of claim 1 wherein said heat spreader is the package lid.

[c20] The method of claim 1 further comprising the step of attaching a heat sink on to said heat spreader.